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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/780,585

02/19/2004

Yasuo Osone

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EXAMINER

SINCLAIR, DAVID M

ART UNIT

PAPER NUMBER

2831

MAIL DATE

DELIVERY MODE

05/28/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/780,585

Applicant(s)

OSONE ET AL.

Examiner

DAVID M. SINCLAIR

Art Unit

2831

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 16-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 16-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date 03/10/2009
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 03/09/2009 have been fully considered but they are not persuasive.

Applicant argues allowability based on the amendment made to independent claim 1. Firstly, applicant argues that Eckl '541 fails to disclose the arrangement of the variable capacitor and the fixed capacitors. Secondly, applicant argues that Kuo '995 fails to disclose arranging components produced in a MEMS process on the opposite side of the main surface. However, Eckl '541 discloses using MEMS-processing to form the variable capacitor system. Kuo '995 discloses arranging movable components on a main surface of a substrate and arranging fixed components on opposite side of the main surface.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The examiner would like to point out that Eckl et al. (2004/0147237) was not addressed in the arguments.

Claim Objections

2. Claims 1, 16-17, & 20 are objected to because of the following informalities:

"MENS-process" is believed to be "MEMS-process" and will be examined as such.

Appropriate correction is required.

3. Claims 3 & 19 are objected to because of the following informalities: "larger than maximum capacitance" should read "larger than a maximum capacitance" and will be examined as such. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1, 3, 16-17, & 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl et al. (2003/0218514) in view of Kuo et al. (2004/0016995).

In regards to claim 1/17,

Eckl '514 disclose a variable capacitor system comprising a substrate ([0043]); a variable capacitor (C3 – fig. 1; [0033]) including a driving mechanism for varying capacitance stored by a pair of electrodes ([0021] & [0050] – MEMS capacitor and changing distance between plates (pair of electrodes) implies a driving mechanism); wherein the variable capacitor is a MEMS-process variable capacitor ([0041]); a plurality of fixed capacitors (C1 & C2 – fig. 1; [0033]) having fixed capacitance stored by a plurality of pairs of electrodes ([0050] – comb-like structure); wiring means for electrically connecting said variable capacitor and said fixed capacitors (rf-port1 wire – fig. 1); and a switch (1_{C1}, 1_{C2}, 1_{C3}) to electrically connect said variable capacitor and a capacitor or capacitors selected from said plurality of fixed capacitors (fig. 1; [0003]); wherein the fixed capacitors are MEMS-process fixed capacitors ([0041]). Eckl '514 fails to disclose the variable capacitor formed in a main surface of said substrate; the plurality of fixed capacitors formed in an opposite side of said main surface; and the switch disposed in said main surface of said substrate, the fixed capacitors directly provided on the opposite side of the main surface.

Kuo '995 discloses a MEMS device (610 – fig. 6; [0102]) formed in a main surface (fig. 6) and a control chip element (600) formed in an opposite side of said main surface (fig. 6); the control chip element directly provided on the opposite side of the main surface (fig. 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize both sides of the substrate of Eckl '514 as taught by Kuo '995 and thus form the MEMS switch and MEMS varactor on a main surface of the substrate (movable/active components on a single side) and form the fixed capacitor(s) (non-movable/passive components) in an opposite side of the main surface to reduce the footprint of the variable capacitor system.

In regards to claim 3/19,

The references as applied above discloses all the limitations of claim 3/19 except said variable capacitor and said fixed capacitors are formed electrically in parallel, wherein a total capacitance of said fixed capacitors is larger than a maximum capacitance of said variable capacitor, and said switch controls the number of said fixed capacitors connected electrically. However, Eckl '541 further discloses said variable capacitor and said fixed capacitors are formed electrically in parallel (fig. 1), and said switch controls the number of said fixed capacitors connected electrically (fig. 1). Eckl '541 discloses the claimed invention except for the total capacitance of said fixed capacitors is larger than

maximum capacitance of said variable capacitor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the total capacitance of said fixed capacitors larger than a maximum capacitance of said variable capacitor to increase the range of possible capacitance values obtainable by the variable capacitor system, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

In regards to claim 16/20,

The references as applied above disclose all the limitations of claim 16/20 except the MEMS-process fixed capacitors are all provided on the opposite side of the main surface of the substrate, which has the MEMS-process variable capacitor. However, the combination of Eckl '541 and Kuo '995 disclose the MEMS-process fixed capacitors are all provided on the opposite side of the main surface of the substrate, which has the MEMS-process variable capacitor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize both sides of the substrate of Eckl '514 as taught by Kuo '995 and thus form the MEMS switch and MEMS varactor on a main surface of the substrate (movable/active components on a single side) and form the fixed capacitor(s) (non-movable/passive components) in an opposite side of the main surface to reduce the footprint of the variable capacitor system.

7. Claims 1, 3, 16-17, & 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl et al. (2004/0147237) in view of Kuo '995.

In regards to claim 1/17,

Eckl '237 disclose a variable capacitor system comprising a substrate ([0053] - wafer); a variable capacitor (C_1 – fig. 1; [0037]) including a driving mechanism for varying capacitance stored by a pair of electrodes ([0037-0038] & [0062]); wherein the variable capacitor is a MEMS-process variable capacitor ([0051]); a plurality of fixed capacitors (C_2 – fig. 1; [0037]) having fixed capacitance stored by a plurality of pairs of electrodes; wiring means for electrically connecting said variable capacitor and said fixed capacitors (rf-port2 wire – fig. 1); and a switch (Sc_2) to electrically connect said variable capacitor and a capacitor or capacitors selected from said plurality of fixed capacitors (fig. 1; [0037])); wherein the fixed capacitors are MEMS-process fixed capacitors ([0051]). Eckl '237 fails to disclose the variable capacitor formed in a main surface of said substrate; the plurality of fixed capacitors formed in an opposite side of said main surface; and the switch disposed in said main surface of said substrate, the fixed capacitors directly provided on the opposite side of the main surface.

Kuo '995 discloses a MEMS device (610 – fig. 6; [0102]) formed in a main surface (fig. 6) and a control chip element (600) formed in an opposite side of

said main surface (fig. 6); the control chip element directly provided on the opposite side of the main surface (fig. 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize both sides of the substrate of Eckl '237 as taught by Kuo '995 and thus form the MEMS switch and MEMS varactor on a main surface of the substrate (movable/active components on a single side) and form the fixed capacitor(s) (non-movable/passive components) in an opposite side of the main surface to reduce the footprint of the variable capacitor system.

In regards to claim 3/19,

The references as applied above discloses all the limitations of claim 3/19 except said variable capacitor and said fixed capacitors are formed electrically in parallel, total capacitance of said fixed capacitors is larger than maximum capacitance of said variable capacitor, and said switch controls the number of said fixed capacitors connected electrically. However, Eckl '237 further discloses said variable capacitor and said fixed capacitors are formed electrically in parallel (fig. 1), total capacitance of said fixed capacitors is larger than maximum capacitance of said variable capacitor ([0042]), and said switch controls the number of said fixed capacitors connected electrically ([0039]).

In regards to claim 16/20,

The references as applied above disclose all the limitations of claim 16/20 except the MEMS-process fixed capacitors are all provided on the opposite side of the main surface of the substrate, which has the MEMS-process variable capacitor. However, the combination of Eckl '237 and Kuo '995 disclose the MEMS-process fixed capacitors are all provided on the opposite side of the main surface of the substrate, which has the MEMS-process variable capacitor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize both sides of the substrate of Eckl '237 as taught by Kuo '995 and thus form the MEMS switch and MEMS varactor on a main surface of the substrate (movable/active components on a single side) and form the fixed capacitor(s) (non-movable/passive components) in an opposite side of the main surface to reduce the footprint of the variable capacitor system.

8. Claims 2 & 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl '514/Eckl '237 and Kuo '995 as applied to claim 1 above, and further in view of Sun et al. (6,307,169).

In regards to claim 2/18,

The references as applied above disclose all the limitations of claim 2/18 except said variable capacitor includes first and second electrode layers formed on said main surface of said substrate with space therebetween, and a driving mechanism for controlling said space between said first and second electrode

layers; and said switch includes first and second wiring layers formed on said main surface of said substrate with space therebetween, a beam supported to said substrate and having a conductive junction, and a driving mechanism for bring said junction into electrical contact with said first or second wiring layer. However, Eckl '514 further discloses said variable capacitor includes first and second electrode layers formed on said main surface of said substrate with space therebetween and a driving mechanism for controlling said space between said first and second electrode layers ([0050] – two electrodes (first and second) distance between said electrodes change – implies a driving mechanism). Eckl'514 fails to disclose said switch includes first and second wiring layers formed on said main surface of said substrate with space therebetween, a beam supported to said substrate and having a conductive junction, and a driving mechanism for bring said junction into electrical contact with said first or second wiring layer.

Sun '169 discloses a MEMS switch (100 – fig. 1-2; C3:L3-4) includes first (102 – fig. 1-2; C3:L5-6) and second (103 – fig. 1-2; C3:L5-6) wiring layers formed on said main surface of said substrate (101 – fig. 1-2; C3:L7) with space therebetween (fig. 2), a beam (104 – fig. 1-2; C3:L24) supported to said substrate and having a conductive junction (106 – fig. 1-2; C6:L23-24), and a driving mechanism for bring said junction into electrical contact with said first or second wiring layer (fig. 3; C5:L1-17).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the MEMS switch taught by Sun '169 as the MEMS switch of the variable capacitor system of Eckl '514 to obtain a variable capacitor system comprising a MEMS switch with increased reliability, reduced stiction, and higher switching speed.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID M. SINCLAIR whose telephone number is (571)270-5068. The examiner can normally be reached on Mon - Thurs. 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego F. Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Diego Gutierrez/
Supervisory Patent Examiner, Art Unit 2831

/D. M. S./
Examiner, Art Unit 2831